



REMARKS

Claims 1-20 were originally presented for examination. In the Office Action mailed February 24, 1998, claims 1-3, 5-6, 8-9, 11-12, 14-15, 17-18, and 20 were rejected under 35 U.S.C. §102(e) as being anticipated by Ogino (U.S. Pat. No. 5,633,976), and claims 4, 7, 10, 13, 16, and 19 were objected to as being dependent upon a rejected base claim. Responsive to this Office Action, claims 1-2, 4, 10, and 16 have been cancelled, claims 3, 9, and 15 have been amended, and new claims 21-23 have been added. Claims 3, 5-9, 11-15, and 17-23 are now pending in the Application. Applicants submit that the amended and new claims more clearly point out the patentable features of the invention and distinguish the same over the prior art of record.

Reconsideration of the application, in view of the following remarks, is hereby respectfully requested.

Before turning to the objected to and rejected claims, a brief summary of the present invention is presented to provide a context for analysis of the claims. The present invention comprises a system and method for increasing the available image capture rate of a digital camera by selectively delaying image processing and compression of captured image data. The system includes a frame buffer in which the raw image data is initially stored; a first RAM spooler for transferring the raw image data to a RAM disk; a first flash spooler for transferring the raw image data from the RAM disk to a flash memory; an image processor for processing and compressing the raw image data; a second RAM spooler for storing the compressed image data into the

RAM disk; and, a second flash spooler for transferring the compressed image data from the RAM disk to the flash memory.

The system utilizes a set of operational priorities designed to maintain the frame buffer in a condition to receive new image data from the imaging device. In particular, spooling raw image data from the frame buffer to the RAM disk is assigned the highest priority; spooling raw image data from the RAM disk to the flash memory is assigned the second highest priority; processing and compressing the raw image data from the flash memory is assigned the third highest priority; spooling the compressed data into the RAM disk is assigned the fourth highest priority; and, spooling the compressed data from the RAM disk to the flash memory is assigned the lowest priority. Operation of the digital camera system according to the foregoing priority scheme facilitates the rapid conveyance of raw image data away from the frame buffer, and thereby frees up the frame buffer to store additional successively captured images.

In paragraph 4 of the Office Action, the Examiner indicated that claims 4, 10, and 16 (inter alia) would be allowable if rewritten in independent form. Independent claims 3, 9, and 15, as amended by the present communication, now respectively incorporate all of the limitations of cancelled claims 4, 10 and 16. Specifically, each of claims 3, 9, and 15 now recite a step of or means for halting the image processing/compression step and returning to the capturing step responsive to detection of another image capture request, and resuming the processing/compression step after the capturing, storing and repeating steps have been completed. Therefore, allowance of independent claims 3, 9, and 15, and of dependent claims 5-8, 11-14, and 17-20 (which depend, directly or

indirectly from independent claims 3, 9, and 15, and which incorporate all the limitations thereof and of any intervening claims), is believed to be proper and is respectfully requested by the Applicants.

Claims 1-3, 5-6, 8-9, 11-12, as originally presented, were rejected under §102(e) as being anticipated by Ogino. Applicants respectfully traverse this rejection as applied to new claims 21-23.

Ogino teaches a digital camera which may be operated in two modes: a continuous mode (activated by holding down the camera shutter button) in which multiple images are captured in rapid succession, and a "single shot" mode (activated by momentary depression of the shutter button), in which a single image is captured. In a first embodiment of the digital camera, described in column 2, line 65 to column 8, line 24 and depicted in FIGS. 1-5, captured images are first processed by a processing circuit (20), which applies compression and modulation processes to the raw image data (column 3, lines 6-8), and then stored in a buffer (22). Images stored in the buffer are subsequently transferred by a memory control circuit (24) to a rigid disk device (26) for semi-permanent storage therein. The available capacity of the buffer is constantly monitored. If the available capacity of the buffer is less than a first predetermined threshold (FIG. 2, step 5), then the continuous mode is disabled while the single shot mode remains operative. If the available capacity of the buffer drops to zero (FIG. 2, step 11), the single shot mode is disabled until sufficient space is freed in the buffer by transfer of the processed images stored therein to the rigid disk device (see column 5, lines 22-33).

According to a second embodiment of the Ogino system, described in column 8, line 19 to column 9, line 29 and depicted in FIGS. 6-7, unprocessed or partially processed image data is stored in the memory buffer 22. The unprocessed or partially processed image data is subsequently processed by digital signal processor 43 (which applies a time-consuming process such as compression to the image data, see col. 8, lines 36-42), and then stored in compressed form in the memory buffer for later conveyance to the rigid disk device. If, during operation of the camera in the continuous mode, the available capacity of the buffer is determined to be below a predetermined threshold (FIG. 7A, step 9), then the continuous mode operation is interrupted while the images are compressed by the digital signal processor and stored, in compressed form, in the buffer, thereby freeing up buffer memory (see column 9, lines 5-14).

Applicants submit that each of new claims 21-23 recites elements neither taught nor suggested by Ogino. Specifically, independent claim 21 recites:

- a memory buffer for initially storing the raw image data;
- first routines for conveying the initially stored raw image data away from the frame buffer to a second memory location to provide space for storing additional, subsequently captured images;
- second routines for processing the raw image data and for storing the processed image data; and
- a central processing unit coupled to the imaging device and to the memory buffer, for executing according to a predetermined set of priorities the first and second routines;

wherein the first routines are assigned priority over the second routines to thereby facilitate the rapid conveyance of raw image data away from the frame buffer [emphasis added].

In contrast, Ogino fails to teach (in any of its embodiments) assigning priority to the first routines (conveying raw image data from the frame buffer to a second memory

location) over the second routines (processing the raw image data and storing the processed images). According to Ogino's first embodiment, the raw image data is processed prior to being stored in the memory buffer. In the second embodiment, the processing (compression) step is preferentially executed to free up buffer space, during which time the camera's operation is limited or disabled.

Furthermore, there would be no motivation to modify the Ogino system with the claimed elements. The Ogino system is primarily directed to controlling the continuous mode operation of a digital camera by monitoring available buffer capacity and disabling the continuous mode operation when capacity drops below a predetermined threshold. The present invention is directed to the markedly different objective of increasing image capture rate by delaying image processing and compression.

Since claims 21-23 contain elements neither anticipated nor made obvious by Ogino or any of the other prior art references of record, allowance of these claims is submitted to be proper.

Conclusion

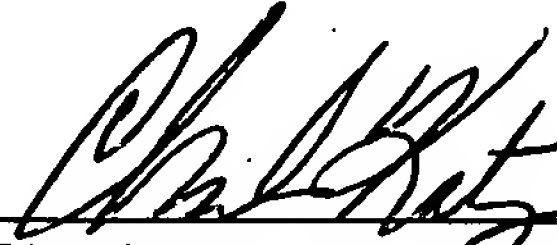
For at least the reasons set forth above, Applicants submit that all claims now pending in the Application are in condition for allowance, and such action is respectfully requested.

If the Examiner has any questions regarding the Application, a telephone call to the undersigned Applicants' representative would be welcomed.

Respectfully,

Eric C. Anderson
Mike M. Masukawa

Date: May 26, 1998

By: 
Charles B. Katz, Reg. No. 36,564
2225 East Bayshore Road, Suite 200
Palo Alto, CA 94303
Tel.: 650-812-3446
Fax: 650-812-3444